IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Docket: 0200528-0003
Applicant: Brandt, Richard A.
Serial No.: 09/528,560
Filed: March 20, 2000
For: Vibration Damping Striking Implement

Group: 3711
Examiner: Graham, Mark S.

37 CFR 1.132 DECLARATION OF DR. RICHARD A. BRANDT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Richard A. Brandt, pursuant to 28 U.S.C. § 1746, declare as follows:

1. I am the sole inventor of Application Serial No. 09/528,560. I submit this declaration in support of the Amendment and Response submitted in reply to the March 5, 2004 Office Action in connection with the above-referenced application for patent.

A. Personal Background

2. I reside at New York, New York and am a Professor of Physics at New York University located at 4 Washington Place, New York, New York 10003. I have been a Professor of Physics at New York University since 1971 as indicated in my curriculum vitae, a copy of which is attached hereto.

3. I have also been the director of Sport Science Research Center at New York University since 1977 and the president of Sport Science Inc. since 1983.

4. I received a SB in Mathematics in 1963 and a Ph.D. in Physics in 1966, both from Massachusetts Institute of Technology.

5. I have provided consulting services for a number of sports organizations and companies including, but not limited to, the following: SGMA, USSSA, ASA, NCAA, MLB, USGA, AMMCO, Easton, Hillerich & Bradsby, Miken, Mizuno, Nike, Spalding and Wilson.

6. I have published over 100 papers on physics, biomechanics and sports science.

7. My recent invited talks and commissioned manuscripts, as indicated in my curriculum vitae, include, among others, the following: Measuring and Restricting Baseball Bat Performance: talk at LISSA meeting on June 2001, Remarks on the ASA Bat Performance Standard: talk at ASA rules meeting on November 30, 1999, The Physics of Baseball: talk at the Centennial Meeting of the American Physical Society on March 23, 1999, Bat Performance and Player Safety in College Baseball: talk at the NCAA baseball conference on March 11, 1999, and Physics of Baseball Bats: colloquium at University of Maryland on March 15, 1998.

8. I am the sole inventor of the following U.S. patents: U.S. Patent No. 5,672,809, entitled Method and apparatus for determining the performance of sports bats and similar equipment; U.S. Patent No. 6,077,178, entitled Striking implement; and U.S. Patent No. 6,344,006 entitled Sports racket having a uniform string structure.

B. <u>Office Action</u>

9. I have reviewed the March 5, 2004 Office Action, U.S. Patent No. 6,432,006 (hereinafter "Tribble"), as well as the Office Action dated October 15, 2003 in the instant application.

10. I am aware that claims 1-3 and 6-10 are rejected under 35 U.S.C. 102(e) as allegedly being anticipated by Tribble for the reasons set forth in the October 15, 2003 Office Action (noting Tribble at Col. 7, line 64 through Col. 8, line 14).

11. I have reviewed the Amendment and Response being submitted on my behalf in response to the March 5, 2004 Office Action. Pursuant to amended claim 1 of the instant application, the present invention discloses a ball bat having a hollow handle and a hollow barrel. Claim 1 has been further amended to include the limitation that the elastomeric material has a modulus of elasticity and damping factor such that the amplitude of the vibrations of the handle arising from the impact of a ball with the striking implement are reduced by at least 80% within about 0.1 seconds from the time when the vibrations first arise on the handle.

12. My review of the Tribble patent revealed the following. Tribble discloses a bat having a solid wood barrel attached to a hollow metal handle, which design is intended to take advantage of the safety of a wood barrel with the strength of a metal handle.

13. Differences in the striking implement of the present invention and the Tribble bat include, but are not limited to, the following. The present invention does not apply to bats having solid barrels, but rather applies only to bats having hollow barrels. The Tribble bat, to the contrary, discloses a bat having a solid wood barrel attached to a hollow metal handle. With respect to shock absorption, in the present invention the elastomeric material has a modulus of elasticity and damping factor such that the amplitude of the vibrations of the handle arising from the impact of a ball with the striking implement are reduced by at least 80% within about 0.1 seconds from the time when the vibrations first arise on the handle, whereas in the Tribble bat it is not possible for the vibrations to be significantly absorbed by an elastomer.

B. Quantitative Analysis

14. I conducted testing through computer modeling to determine the shock absorption capabilities of hollow barrel metal bats (as in the present invention) and of solid barrel wood bats (as in the Tribble bat). Specifically, I considered identical impacts between a softball and a solid barrel wood bat and a hollow barrel aluminum or composite bat.

15. I assumed that the barrels of each of the bats are terminated in a stem, as described in Tribble and in the present invention. The impact gives rise to transverse vibrations in the barrel, which are transmitted down the barrel into the handle of conventional bats, and into the stems of the bats under consideration.

16. My testing shows that the vibrations transferred to the stem of the solid barrel bat result in a substantially increased amplitude, making it impossible for these vibrations to be absorbed in order to reduce sting, whereas the vibrations transferred to the stem of the hollow barrel bat result in a substantially decreased amplitude, making it easy for these vibrations to be absorbed in order to reduce sting. It is the greater linear mass density of the solid barrel bat compared to the hollow barrel bat that gives rise to this difference in vibration amplitudes in the stems. For the solid barrel bat, the linear density of the barrel is greater than that of the stem, whereas for the hollow barrel bat, the linear density of the barrel is less than that of the stem.

17. In the tests which I conducted using computer modeling of the solid barrel bat and the hollow barrel bat, I assumed that the vibrations set up in the barrels generated by the ball impacts have an amplitude of 0.1" and a frequency of 200 Hz. The resultant (computer

generated) vibrations in the stems are shown in Figure 1 for the solid barrel bat and in Figure 2 for the hollow barrel bat.

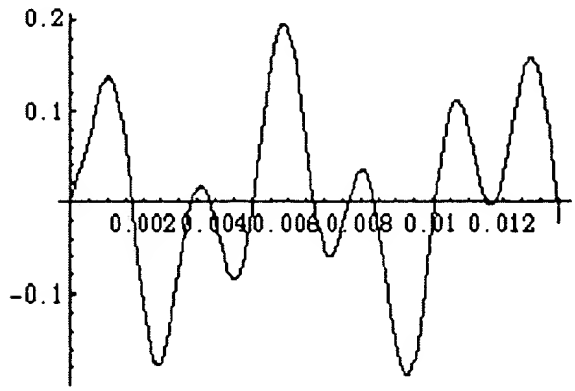

Figure 1 (solid barrel)

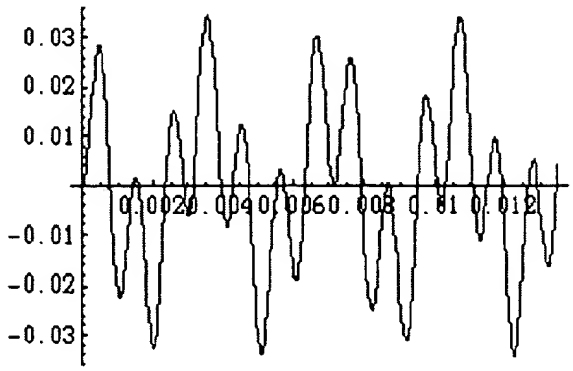

Figure 2 (hollow barrel)

18. For the solid barrel bat, the stem vibration amplitude is seen to be 0.2" and the frequency is seen to be 290 Hz, whereas for the hollow barrel bat, the amplitude is seen to be 0.03" and the frequency is seen to be 670 Hz. Thus the size of the vibration in the hollow barrel bat stem is 3.3 times less than the size (0.1") of the barrel vibration, and 6.6 times less than the size (0.2") of the solid barrel bat stem vibration. In other words, for the solid barrel bat, the stem mechanism worsens the sting by a factor of 2, whereas for the hollow barrel bat, the stem mechanism lessens the sting by a factor of 3.3. It is not possible for the 0.2" vibration of the solid barrel bat stem to be significantly absorbed by an elastomer. The increased vibration frequency of the hollow barrel bat is an added benefit because higher frequencies are more readily absorbed by an elastomer.

19. Therefore, this computer modeling supports my position that the elastomeric material has a modulus of elasticity and damping factor such that the amplitude of the vibrations of the handle arising from the impact of a ball with the striking implement of the present invention are reduced by at least 80% within about 0.1 seconds from the time when the vibrations first arise on the handle, whereas in the solid barrel (Tribble) bat, it is not possible for the vibrations to be significantly absorbed by an elastomer.

20. I declare further that all statements made in this declaration of my own knowledge are true, that all statements made on information and belief are believed to be true, and, further, that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of any patent that may issue from the present application.

I declare under penalty of perjury that the foregoing is true and correct.

Executed this ___4_ day of June, 2004 in New York, New York.

Richard A. Brandt

Dr. Richard A. Brandt

CURRICULUM VITAE

Richard A. Brandt
Department of Physics
New York University
4 Washington Place
New York, NY 10003

1. Birth

   December 10, 1941

2. Education

   SB from MIT in 1963
   Ph.D. from MIT in 1966

3. Current Positions

   Professor of Physics at NYU, since 1971
   Director of Sport Science Research Center at NYU, since 1977
   President of Sport Science Inc., since 1983

4. Relevant dates

   1975, introduced course "Physics and Sports" at NYU
   1977, introduced course "Physics of the Human Body" at NYU
   1977, established Sport Science Research Center at NYU
   1983, founded Sport Science Inc.
   1994, proposed BPF bat performance standard to softball organizations
   1995, bat performance standard adopted by USSSA, etc.
   1998, bat performance standard adopted by ASA
   2000, bat performance standard system licensed by SGMA

5. Sports organizations consulted for

   SGMA, USSSA, ASA, NCAA, MLB, USGA. etc

6. Sports companies consulted for

   AMMCO, Easton, Hillerich & Bradsby, Miken, Mizuno, Nike, Spalding, Wilson, etc

7. Publications

   Over 100 published papers on physics, biomechanics, and sport science

8. Recent invited talks and commissioned manuscripts

PHYSICS OF BASEBALL BATS, colloquium at University of Maryland, 3/15/98

OPTIMAL PERFORMANCE IN SPORTS, talk at NY Academy of Sciences, 5/13/98

RESPONSE TIMES FOR HIGH-SPEED BALL DEFLECTIONS IN BASEBALL AND SOFTBALL, report to SGMA, 10/19/98

BAT PERFORMANCE AND PLAYER SAFETY IN COLLAGE BASEBALL, talk at NCAA baseball conference, 3/11/99

THE PHYSICS OF BASEBALL, talk at the Centennial Meeting of the American Physical Society, 3/23/99

PROPOSED STANDARDS FOR HIGH-SCHOOL BASEBALL BATS AND BALLS, talk at annual meeting of the National Federation of High School Baseball Associations, 7/17/99

BAT PERFORMANCE STANDARDS AND PLAYER RESPONSE TIMES IN SOFTBALL AND BASEBALL, talk at SGMA annual meeting, 9/25/99

REMARKS ON ASTM AND ASA BAT PERFORMANCE STANDARDS, talk at ASTM meeting, 11/27/99

REMARKS ON THE ASA BAT PERFORMANCE STANDARD, talk at ASA rules meeting, 11/30/99

MEASURING AND RESTRICTING BASEBALL BAT PERFORMANCE: talk at LISSA meeting, 6/20/01